THE Cane Growers' QUARTERLY BULLETIN

VOL. XXIII, No. 2 1 OCTOBER, 1959

Sugar Experiment Stations Board.

THE HON. O. O. MADSEN, M.L.A., Minister for Agriculture and Stock, Chairman.
Dr. W. A. T. SUMMERVILLE, Deputy Chairman.
MR. J. W. INVERARITY, Member.
MR. L. G. SCOTNEY, Cane Grower, Member.

Bureau of Sugar Experiment Stations.

N. J. KING, Director.
L. G. VALLANCE, Asst. Director.
R. W. MUNGOMERY, Asst. to Director.

Head Office Staff.

J. H. NICKLIN, Chief Technologist (Engr.).
C. G. HUGHES, Senior Pathologist (I).
D. R. L. STEINDL, Senior Pathologist (I).
L. R. BRAIN, Senior Mill Technologist (II).
H. E. YOUNG, Senior Physiologist (II).
O. W. STURGESS, Research Pathologist.
K. C. LEVERINGTON, Chemist.
R. F. BEALE, Asst. Engineer.
A. D. DOOLAN, Laboratory Technologist.
J. R. BURGE, Analyst.
J. M. SEDL, Analyst.
C. C. HORNE, Secretary.
A. D. BEAL, Asst. Accountant.
S. C. LEDDY, Records Clerk.
E. J. Barke, Clerk.
B. HJELM, Clerk.
MISS F. M. DOOLAN, Librarian.
MISS E. O'SULLIVAN, Clerk.
MISS J. E. MURPHY, Clerk-Typiste.
MISS B. A. MURPHY, Clerk-Typiste.
MISS B. A. VINES, Clerk-Typiste.
MISS M. P. LYNCH, Clerk-Typiste.
F. SHORT, Sen. Lab. Attendant.

Country Staff.

Meringa. Address: P.O. Box 122, Gordonvale; Phone: Gordonvale 95.

J. H. BUZACOTT, Senior Plant Breeder (I).
G. WILSON, Senior Entomologist (I).
J. C. SKINNER, Senior Geneticist (I).
B. G. ADKINS, Research Mill Technologist.
B. T. EGAN, Pathologist.
B. E. HITCHCOCK, Entomologist.
G. BATES, Senior Adviser.
A. G. BARRIE, Agronomist.
C. A. REHBEIN, Adviser.
N. G. GRAFF, Technical Officer (I).
F. C. LINDSAY, Technical Officer (I).
G. H. WHITAKER, Field Assistant.
N. J. BURMAN, Technical Officer (II).
MISS N. J. SMITH, Clerk-Typiste.
MISS M. BARBER, Clerk-Typiste.
R. J. JENKINS, Lab. Attendant.

Innisfail. Address: P.O. Box 630, Innisfail; Phone: Innisfail 271.

S. O. SKINNER, Senior Adviser.
I. T. FRESHWATER, Adviser.

Ingham. Address: P.O. Box 41, Ingham; Phone: Ingham, 468.

O. W. D. MYATT, Senior Adviser.
I. J. V. STEWART, Field Assistant.

Ayr. Address: P.O. Box 28, Brandon; Phone: Brandon 45.

G. A. CHRISTIE, Senior Adviser.
J. WESDORP, Asst. Agronomist.
L. S. CHAPMAN, Adviser.
J. A. HUCKNALL, Field Assistant.
MISS B. L. LENNOX, Clerk-Typiste.

Mackay. Address: P.O. Box 280, Mackay; Phone: Mackay 2717.

G. C. BIESKE, Research Chemist.
C. G. STORY, Senior Adviser.
A. A. MATTHEWS, Adviser.
C. M. MCALEESE, Adviser.
L. E. RODMAN, Field Assistant.
J. E. MILLIKEN, Field Assistant.
D. A. BEAK, Cadet.
MISS J. L. CRONIN, Clerk-Typiste.
MISS C. HARVISON, Clerk-Typiste.
J. VELLA, Lab. Attendant.

Bundaberg. Address: P.O. Box 138, Bundaberg; Phone: Canelands 228.

R. DEICKE, Senior Mill Technologist (II).
A. G. CLAIRE, Mill Technologist.
R. B. MOLLER, Agronomist.
H. G. KNUST, Senior Adviser.
N. MCD. SMITH, Senior Adviser.
E. D. JENSEN, Asst. Mill Technologist.
F. GALETTO, Asst. Mill Technologist.
J. ANDERSON, Adviser.
R. K. HILHORST, Technical Officer (I).
P. G. ARNOLD, Field Assistant.
MISS J. PRIEBE, Clerk-Typiste.

Nambour. Address: P.O. Box 139, Nambour; Phone: Nambour 668.

C. L. TOOHEY, Adviser.

BUREAU OF SUGAR EXPERIMENT STATIONS
BRISBANE

THE CANE GROWERS' QUARTERLY BULLETIN

ISSUED BY DIRECTION OF THE
SUGAR EXPERIMENT STATIONS
BOARD

1 OCTOBER, 1959

Wholly set up and printed in Australia by
WATSON FERGUSON AND COMPANY
Brisbane, Q.

CONTENTS

	Page
Editorial	39
Silver Anniversary of Cane Breeding at Meringa, by J. H. Buzacott	40
Transmission of Chlorotic Streak Disease, by O. W. Sturgess	42
Forecast of Approved Varieties for 1960	45
Twenty-Five Years Ago	45
Control of Grasses on Tully Tramline, by E. H. Fox	46
More Cockatoo Damage	48
Pathology at the I.S.S.C.T., Hawaii, by C. G. Hughes	49
Heat Treating Cane Varieties at Meringa	51
Gambia Pea Control, by G. C. Bieske	52
Pictorial Section	53
Nitrogen—Splitting the Application, by L. G. Vallance	57
Crop Disposal, by C. A. Rehbein	58
The Control of Ratoon Stunting Disease, by D. R. L. Steindl	59
Where do New Diseases Come From ? by B. T. Egan	61
Trees—A Profitable Use for Waste Areas on Farms, by S. O. Skinner	63
BHC for Wireworm Control—Do not use Weak Mixtures, by R. W. Mungomery	65
A Note of Warning	66
Field Day Address—Meringa, 1959, by L. G. Vallance	67
Q.57 and Blue-top, by C. G. Hughes and S. O. Skinner	69
An Unusual Cause of Germination Failure, by L. S. Chapman	70
Refresher Course in Pest and Disease Control	71
Random Gleanings	72

This Bulletin is an official publication of the extension service of the Bureau of Sugar Experiment Stations, issued and forwarded by the Bureau to all cane growers in Queensland.

The Cane Growers' Quarterly Bulletin

VOL. XXIII. OCTOBER 1, 1959 No. 2

EDITORIAL

Sugar as an Industrial Raw Material

Some discussions were held recently between leaders of the various sugar organizations and the C.S.I.R.O. in an attempt to interest that research body in finding some uses for sugar other than as a food.

This attempt, if successful, would result in the C.S.I.R.O. initiating a basic research programme with a view to establishing Australian chemical industries using sugar as a raw material.

Such work would not necessarily copy or parallel the investigation of the Sugar Research Foundation of New York. Rather would it mean the co-opting of a new team of scientists with a fresh approach to a very difficult problem.

Australia's sugar surplus is not likely to be a flash in the pan caused by a succession of good seasons. Continuing over-production may conceivably be remedied by a large chemical industry based on sugar; but the break through into sucrochemistry is a possibility for the distant—not the immediate—future.

At the moment we can only hope, firstly, that a C.S.I.R.O. team will tackle the problem and, finally, that it will come to light with an economic and attractive solution.

The oil industry today is a striking example of a big industry which became much bigger following the development of petro-chemistry. Vast industrial enterprises are now using oil and its products as raw materials—but it took the best scientific brains, lots of capital and many years of effort to show the way.

To use sugar as a base chemical for other industries is a new concept. We cannot expect miracles overnight, but a start should be made without delay.

Silver Anniversary of Cane Breeding at Meringa

By J. H. Buzacott

In Queensland's centenary year an event of lesser importance is apt to slip by unnoticed. The year 1959, however, is one of some significance for the Northern Sugar Experiment Station for it marks the twenty-fifth year since sugar cane breeding commenced there.

Fig. 20—Present plant breeding laboratory and glasshouse at Meringa.
—Photo J. H. Buzacott

Our far northern station, or "Meringa", as it is more widely known, commenced its history in 1917 when it was built as a headquarters for entomological investigations into the control of what was then the major cane pest—the grub of the greyback beetle. Meringa functioned solely in the interests of pest control until 1934, when it was decided to transfer the cane breeding activities of the Bureau of Sugar Experiment Stations, formerly conducted at South Johnstone ,to a site near Cairns. Cane breeding by the Bureau was first commenced in 1921 when the South Johnstone Experiment Station was established for that purpose. After some years it was found that better flowering of cane and more favourable seed-setting occurred at Freshwater near Cairns. Since Meringa was within easy distance of Cairns, and the Bureau already had a field station there, it was decided in 1934 to transfer the whole of the cane-breeding activities from South Johnstone to Meringa.

At the time when the transfer was effected only about one acre of land at Meringa was devoted to the cultivation of sugar cane because only small amounts of cane were then required for entomological experiments. With the development of the cane breeding work the area under cane has necessarily increased considerably and, at the present time, the station has 62 acres assigned for cane growing, of which a little over 20 are now cropped each year. The staff,

too has increased in numbers. From its lowest ebb in early 1934, when the total staff consisted of one officer and two labourers, it has now grown to 16 officers and six labourers, and equipment and accommodation has been increased accordingly.

The Northern Experiment Station has earned lasting fame for the part it played in the spectacular control of the cane grub. This grub was one of the most destructive cane pests known anywhere in the world, and it was at Meringa that the first tests for the control of this pest with benzene hexachloride were made. The saving to the sugar industry resulting from the successful culmination of those experiments is estimated to be worth a figure of the order of half a million pounds each year. High as this figure is, it is quite dwarfed by the success of the cane breeding work.

At Meringa seed is produced for the development of seedlings at the four stations which comprise the field units of the Bureau of Sugar Experiment Stations. All "Q" varieties with the exception of the very early ones viz., Q.2, Q.10, Q.20, Q.25, Q.54 and the high numbered ones such as Q.813, originated from seed produced at Meringa. There are in all 21 commercial "Q" varieties which originated in this way at Meringa, and the total tonnage of them harvested amount to no less a figure than 29,900,000 tons. A very conservative estimate of the value of the sugar produced from this tonnage of cane would be £150,000,000. This figure is now increasing at a very rapid rate, since in 1958 alone the value of sugar produced from these "Q" varieties was £24,000,000.

Outstanding amongst the "Q" varieties is Q.50, which was selected at Mackay from a batch of seedlings grown from seed produced at Meringa in 1938. Q.50 has for several years been the premier variety in Queensland and more than 19,000,000 tons of it have been harvested since it was first approved in 1947. Q.28 ranks second in production figures with 3,800,000 tons and four others viz., Q.44, Q.47, Q.57 and Q.58, have topped the one million ton mark, the two latter being relatively recent releases.

The total tonnage produced by each of the commercial "Q" varieties, bred at Meringa and selected at centres throughout the State, is of considerable interest and appears below with the varieties listed in order of production figures:—

Variety	First Approved	Tonnage Harvested
Q.50	1947	19,136,691
Q.28	1942	3,880,389
Q.44	1943	1,609,635
Q.47	1946	1,073,124
Q.57	1954	1,050,019
Q.58	1955	1,034,837
Q.49	1946	750,882
Q.55	1951	323,630
Q.45	1945	314,345
Q.42	1944	211,617
Q.51	1950	122,783
Q.59	1956	110,079
Q.61	1957	87,391
Q.63	1958	43,752
Q.64	1957	34,859
Q.48	1946	31,694
Q.56	1956	28,716
Q.66	1958	22,820
Q.65	1958	15,939
Q.70	1958	9,224
Q.68	1959	9,023
	TOTAL:	29,901,449

The full story of cane breeding at Meringa has yet to be completed. Each year sees the introduction of new methods and the application of new techniques. Each year registers one or more new varieties on the Approved Lists for the state. "Great oaks from little acorns grow" and no better comparison with this truism could there be than the great wealth which has grown out of the Northern Sugar Experiment Station, a small outpost of scientific research situated a thousand miles from its parent body in the capital city of the State.

Transmission of Chlorotic Streak Disease

By O. W. Sturgess

Throughout the years that followed the discovery of chlorotic streak disease in many parts of the world, numerous reports were written about the disease; these dealt particularly with the expression of symptoms, the occurrence in cane plantings on low-lying and inadequately drained areas, and the hot-water treatment of setts, which ensures that planting material is free from the disease. Despite the amount of information on these aspects of chlorotic streak, there is no conclusive evidence as to the cause of the disease or the general methods of its spread in the field.

In 1942, investigators in Louisiana demonstrated that chlorotic streak may be transmitted from diseased to healthy cane by means of a species of leafhopper, which populates cane plantings there. Attempts to obtain insect transmission elsewhere have not been successful. This species does not occur in Australia but, in Queensland, a wide range of insects, including other species of leafhoppers which are found associated with diseased plants, has been tested.

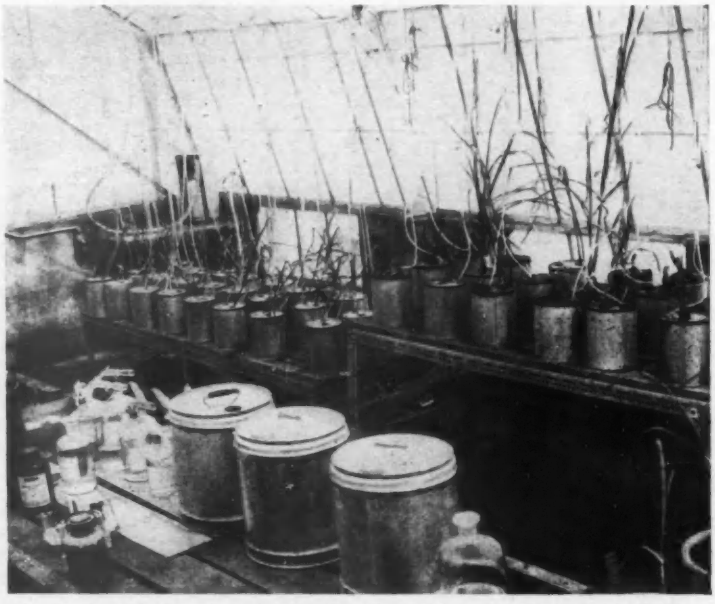

Fig. 21—General view of nutrient-solution transmission experiments in the Brisbane glasshouse.

—Photo D. R. L. Steindl

Chlorotic streak has been known in this State for three decades. In the early years following its discovery it was confined to the mill areas north of Townsville and to Proserpine and Nambour; subsequently the disease has broken out in every other district, with the exception of the Lower Burdekin. Its entry into areas which at one

time were free of the disease has enabled the field spread to be carefully noted, and observations have revealed some significant information. In districts such as Mackay, Bundaberg and Giru, the spread of chlorotic streak from initial disease centres of one or two stools in a planting to other stools in the same planting, or from a diseased planting to adjacent and nearby healthy plantings frequently indicated that surface and drainage waters were associated with field spread and expression of symptoms. The distribution or pattern of spread of the disease did not follow that which might be expected when an aerial vector, such as a leafhopper, is involved.

On the basis of the field observations, and previous culture experiments both here and in other countries and the unpromising experimental results with insect vectors, further experiments were initiated at Meringa and Brisbane to determine the role which drainage waters and root systems might play in the movement of chlorotic streak from diseased to healthy plants. The growing of plants in nutrient solutions was selected as a suitable starting point for further transmission studies for two reasons. Firstly, nutrient solutions provide water continuity between the root systems of diseased and healthy plants and, secondly, root systems in solution may be readily observed and handled with the absolute minimum of plant growth disturbance.

The application of a nutrient solution or gravel culture technique, under glasshouse or insectary conditions, resulted in the transmission of chlorotic streak from diseased to healthy plants.

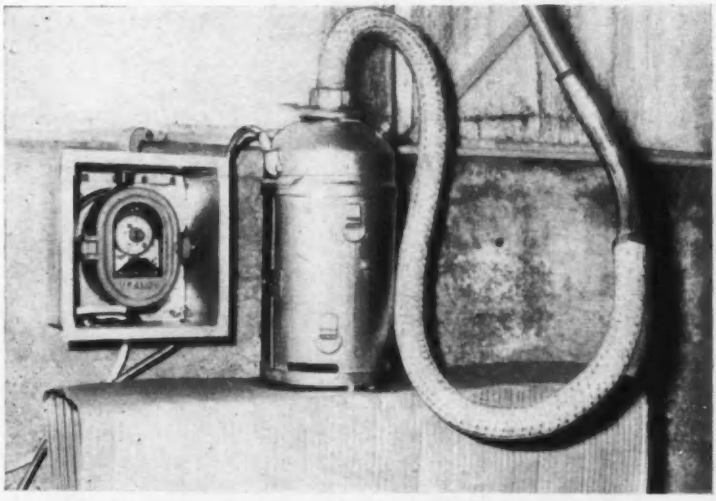

Fig. 22—The time switch and motor for aerating the solutions.
—Photo D. R. L. Steindl

The technique is briefly described below. Cane shoots from diseased and healthy setts were raised separately in sterilised sand and, when sufficient shoot roots were developed, individual shoots were removed from the setts and transferred to nutrient solution or gravel containers. The majority of nutrient solutions were aerated through aquarium air-stones. An electrically operated time switch allowed air to be forced through the solutions from

a blower on a regular hourly basis. A number of non-aerated containers were also maintained.

Diseased and healthy shoots were grown together as companion plants within individual containers. Transmission of chlorotic streak from the diseased plant to the healthy companion plant took place in each of the three types of containers, that is, aerated, non-aerated and gravel. The results of the experimental work suggest that root transmission of the disease may have taken place either by direct root contact, with the solution influencing disease expression once the plant contracted the disease, or by the solution acting as the agent of spread, independent of contact between diseased and healthy plants.

A further experiment was designed to separate the two factors possibly involved in the transmission. Healthy and diseased shoots were grown separately in aerated nutrient solutions and arranged as constant pairs; the solutions of the pairs were interchanged every second day, the weekend excepted. Positive transmissions occurred, again indicating that the infective principle responsible for the chlorotic streak disease is disseminated through solutions independently of direct root contact.

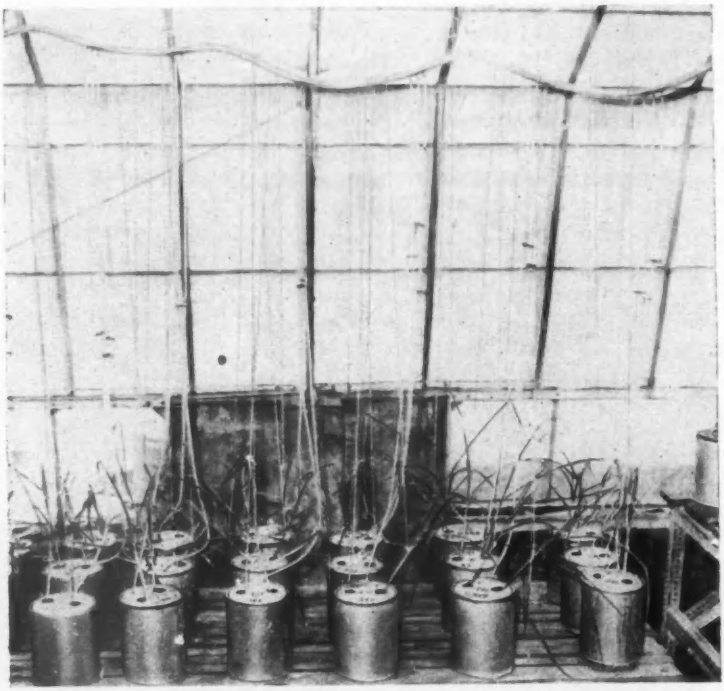

Fig. 23—Every solution container has its own air-line in this newly started experiment.
—Photo D. R. L. Steindl

The experimental data obtained in the glasshouse support the field observations on the spread of chlorotic streak and indicate the role of surface and drainage waters in its field spread. Further experiments are in progress which may shed some further light on the actual mechanism of root transmission.

Forecast of Approved Varieties for 1960

In accordance with usual practice, the Bureau has prepared a forecast of the changes it is proposed to make in the approved variety list of 1960. Any interested farmers' organizations which consider alterations should not be made along the lines indicated, or wish to submit any other changes, are invited to submit their views to the Director of Sugar Experiment Stations before 30th November, 1959. Any objections against varietal deletions, or suggestions for additions, must be accompanied by a detailed statement of the reasons for such objections or suggestions. No action can be taken in respect of late or unsubstantiated requests.

Mossman—Delete H.Q.426.
Hambledon—Delete Badila Seedling.
Mulgrave—Add Q.67. Delete Eros and Badila Seedling.
Babinda—Add Q.67. Delete Comus, H.Q.426 and Badila Seedling.
Goondi—Add Q.59. Delete Ragnar.
Tully—Delete Q.50.
Victoria—Add Damon.
Macknade—Add Damon.
Invicta (North of Townsville)—Delete Badila.
Invicta (South of Townsville)—Delete Badila, Comus and H.Q.426.
Pioneer—Delete H.Q.426.
Kalamia—Delete H.Q.426.
Inkerman—Delete H.Q.426.
Proserpine—Add Q.73. Delete Badila, Comus, Q.28 and Q.45.
Farleigh—Add Q.73. Delete Badila, Comus, C.P.29/116, Q.45 and Q.56.
Racecourse — Add Q.73. Delete C.P.29/116.
Pleystowe—Add Q.73. Delete Badila, C.P.29/116, P.O.J.2878 and Q.56.
Marian—Add Q.73. Delete Badila, C.P.29/116, Q.45 and Q.56.
Cattle Creek—Add Q.73. Delete Badila, C.P.29/116, P.O.J.2878, and Q.56.
North Eton—Add Q.73. Delete Badila, C.P.29/116, Q.28 and Q.56.
Plane Creek—Add Q.73. Delete C.P.29/116, P.O.J.2878, Q.28 and Q.56.
Bingera—Delete Co.290.
Fairymead—Delete Co.290.
Gin Gin—Delete P.O.J.2878 and Q.49.
Qunaba—Delete Q.55.
Isis—Add Q.69 and Q.72. Delete Q.47 and Q.51.
Maryborough—Add Q.70 and Q.71. Delete Co.290, Co.301, P.O.J.-2878, Q.49 and Vesta.
Moreton—Add Q.71 and Trojan.
Rocky Point—Delete Q.28 and Q.47.

Twenty-Five Years Ago

Twenty-five years ago. In the October, 1934, issue of this Bulletin the original publicity was given to the fertilizer mixtures devised by the Bureau on the basis of its hundreds of fertility trials and special soil analysis methods. The new fertilizers were called Sugar Bureau Mixtures and they are still known under that name. With only very minor changes in their formulation these mixtures have stood the test of a quarter of a century's use on Queensland cane farms and are being used more widely each year.

Control of Grasses on Tully Tramline

By E. H. Fox
Supervisor, Tully Cane Pest and Disease Control Board

Di-chloropropionic acid is usually referred to as Dalapon when used as a weedicide; and the product used in the trials described is sold under the trade name of "Dowpon." It is an easily soluble powder with a soapy feel.

Qualitative experiments in 1958 suggested that the material could be useful in the suppression of panicum* and guinea grasses during the period of lush growth at Tully, which occurs during the wet, hot months January - April. Accordingly, sections of tramline were treated with Dowpon on the 8th January of this year. Panicum, blady grass and guinea grass all reacted in much the same way and Figure 24, taken on February 2nd after 25 inches of rain had fallen, shows the control obtained. Figure 25 is a closeup view of the same section.

Twenty-eight days later, after another 35 inches of rain had fallen, the grasses were still dying back and, in some cases, weeds were able to come through due to lack of competition from the once paramount panicum grass.

After a lapse of another 35 days and a further 22 inches of rain the photo in Figure 26 was taken on the same section of tramline. It shows a crop of flowering blue-top in the foreground (of no importance in tramline maintenance) covering the debris of dead and dying grass. A month later, occasional green shoots were noted on some of the lesser-affected grass runners, but the general picture presented a zone of dead stems, through which other weeds were finding their way.

Two methods of application were used. The first consisted of a Marino

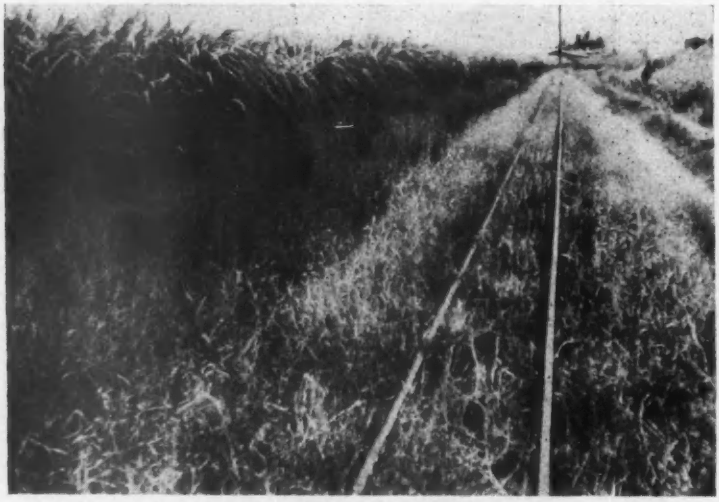

Fig. 24—The tramline was sprayed with Dowpon on the 8th January and the photograph taken on 2nd February. This excellent control of grass was obtained despite the fact that 25 inches of rain fell during the period.

—Photo W. M. Mullins

*Known as Para grass in other districts.

pump, mounted on a Ferguson tractor with a 60 gal. tank on the three point lift. Two operators walked with the hand sprays which were of the cone type. They treated a strip 8 - 9 ft. wide, and four miles long, in one day using 90 lbs. Dowpon (at approximately 12/9 per lb), and could have doubled the distance were it not for delays in refilling the tank. The cost of the weedicide used was therefore a little over £14 per mile, and there is reason to believe that this could be considerably reduced without adversely affecting control.

tinent to point out that the results may hold good only in a climatic environment such as that of Tully, where the rain was practically continuous throughout the period of the trial. It is certain, however, that with any of the previously used treatments repeated applications would have been necessary to suppress the constant ratooning of these grasses. If, therefore, the cost of the Dowpon application is one and a half times as great as that of P.C.P. the fact that only one treatment is necessary would cause the economics to favour Dowpon.

Fig. 25—A close up view of section of the tramline shown in Fig. 24.
—Photo W. M. Mullins

The second method, using a Diesel loco pulling 4 x 400 gal. tanks, feeding a pump and 4 Welco type jets, showed slightly better speed but covered a strip only 5 - 6 ft. wide with indifferent distribution of the material. This equipment was designed for standard P.C.P. spraying and could, no doubt, be redesigned to combine the best features of both methods.

In considering the effectiveness of these Dowpon treatments it is per-

This would still be the case even though a P.C.P. treatment may be needed at the end of the wet season to take care of weeds and occasional regrowth.

It may be that the constant suppression of the grasses during two or three seasons will necessitate alternating the Dowpon treatment with one using a hormone of the 2,4-D type to suppress the broad-leaf weeds. Future circumstances will determine

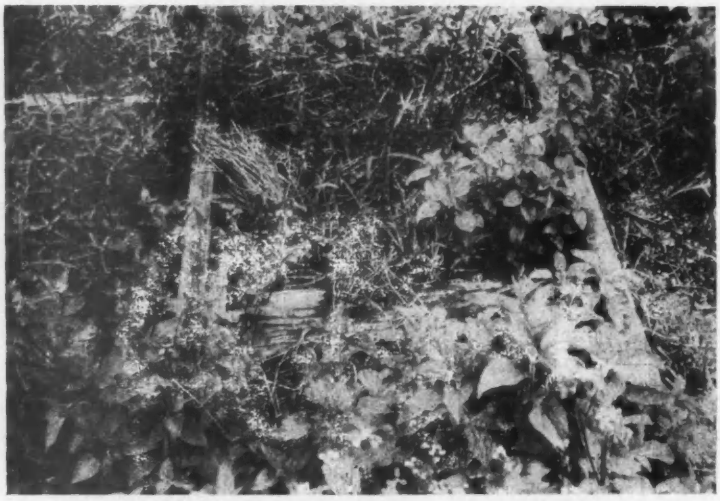

Fig. 26—This photograph was taken 13 weeks after spraying during which time over 80 inches of rain had fallen. The grasses are still suppressed and some broadleaf weeds are showing through the dead grass.

—Photo W. M. Mullins

which one is to be used. These chemicals are said to be compatible one with the other but, at present, Dowpon is much too expensive to waste on portions of the line which carry no grass problems.

A further and final point to be kept in mind is that some vegetation will always have to grow in the wet tropics, so that when a section of the line is found to be covered with a thick carpet of a suitable low-growing grass such as couch it will be wise to leave it undisturbed.

More Cockatoo Damage

In the October 1958 issue of the Quarterly Bulletin, a detailed article was published on cockatoo damage to sugar cane in the Proserpine area. During the winter months of the present year similar damage was occasioned on numerous farms in the Tully area. While the total loss was not great, the severity of damage was alarming to the individual growers concerned.

This bird has been long recognised as a pest of cane. The type of damage caused by the "efficient" manner in which the cockatoo destroys the crop is quite unmistakable from other pests and is quite intriguing. The parrot, cockatoo and budgerigar are well-known for their "playful" destructiveness when kept as pets. In cane, the white cockatoo is apparently no exception, and is not content until every stalk in the patch, from about two feet up, is severely pecked and felled.

Pathology at the I.S.S.C.T., Hawaii

By C. G. Hughes

Requests for contributions sent to all known centres of research or experiment in sugar-cane diseases brought an excellent response. As a result, delegates to the Pathology Section of the International Society of Sugar Cane Technologists' Congress in Hawaii held last May had an interesting array of papers for consideration and discussion.

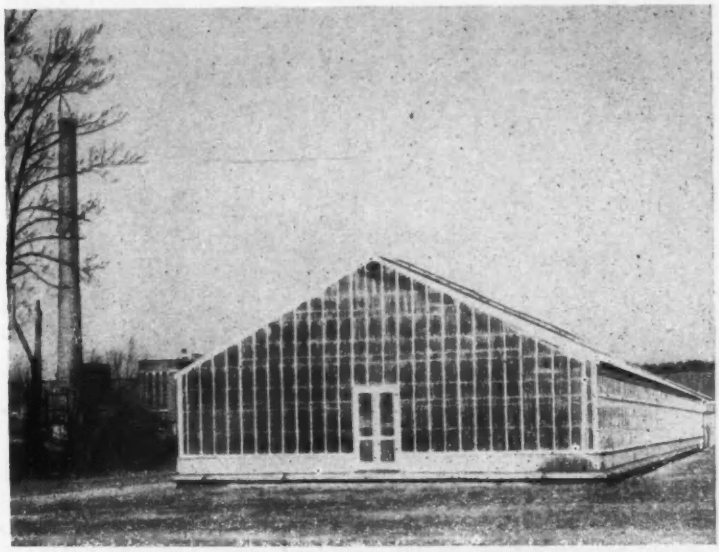

Fig. 27—The sugar-cane quarantine house of the United States Department of Agriculture near Washington is a comparatively large building.

—Photo by courtesy International Society Sugar Cane Technologists.

The 26 papers came from 11 different countries and the range of subjects was correspondingly wide, although ten of them were devoted to descriptions of quarantine arrangements. These formed a symposium on the various methods adopted for the safe transfer of sugar cane from one country to another which lasted two full sessions of the Congress. Their presentation and subsequent publications in the Proceedings should give a clear picture of the quarantine facilities in most cane-producing countries and should also indicate possible weaknesses in the current system of international exchange of varieties.

The remaining 16 papers were presented in four sessions of the Pathology Section. Since ratoon stunting is still a problem in all cane countries where the disease is admitted to be present, it was only to be expected that there would be a number of papers dealing with various aspects of the disease. Workers at the Louisiana State University, including Professor S. J. P. Chilton, whom many will recall meeting when he was in Queensland in 1955, examined the results of the control campaign in Louisiana. They expressed general satisfaction with the hot-air treatment, which they were forced to adopt when it was found

that their immature crops yielded setts extremely sensitive to hot water. The commercial hot-air oven developed is electrically heated and automatically controlled and has a capacity of approximately one ton of plants in lengths of about five feet on special castor-mounted racks. There are 70 of these ovens at present in use in Louisiana. Yield trials in Louisiana showed that control of ratoon stunting gave an increase in crop of 60 per cent. in C.P.44-101, the most important cane, and 45 per cent. in C.P.36-105, another popular cane. Incidentally it was also shown that C.P.36-105 was an excellent indicator variety for the disease, and current tests in Queensland are aimed at determining whether it is better for this purpose than Q.28. R. Antoine of Mauritius outlined the results of his attempts to evolve a diagnostic technique for ratoon stunting using the dyestuff, tetrazolium, and workers from Taiwan and Cuba discussed the control of the disease in their respective areas. The other paper concerned with ratoon stunting was by a botanist with the United States Department of Agriculture who made a study of the effects of the disease on the structure of the vascular bundles within the stalk. This was an important paper, since the identification of the disease in mature stalks relies on the changes in colour of the bundles exposed when the nodes are sliced.

Downy mildew disease, which has now apparently been eradicated from the cane fields of Queensland, is still a problem in Taiwan and, in papers from that country, the mode of resistance to the disease and its transmission from maize to cane and vise versa were discussed.

Single papers on particular subjects submitted from various countries included studies on the inheritance and susceptibility to red rot and on recovery of cane seedlings from mosaic in Louisiana; a description from Hawaii of two hitherto unrecorded leaf disorders and of tests with two fungicides for the control of Pythium in flats of sugar-cane seedlings; and an

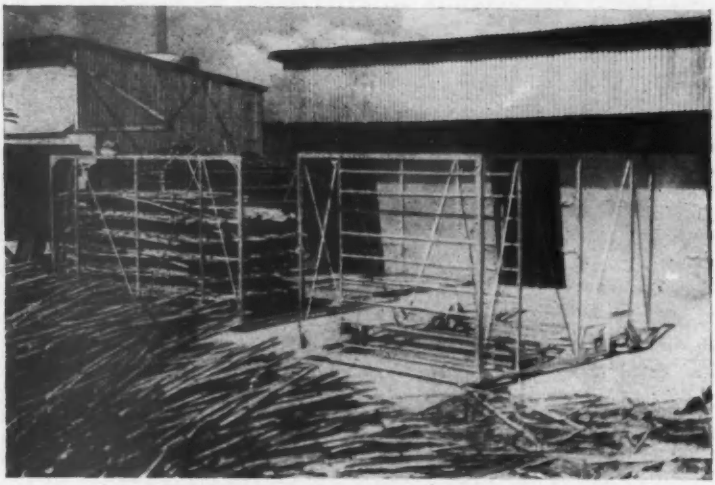

Fig. 28—A commercial, double-oven, hot-air treatment plant for the control of ratoon stunting in Louisiana.

—Photo by courtesy International Society Sugar Cane Technologists.

article from Professor Ocfemia of the Philippine Islands on the effect of gibberellin on stools suffering from Fiji disease. It might be mentioned that the gibberellin did reduce the stunting due to the disease, but enlarged the galls, and obviously would be of no significance in its control. A paper by P. E. Robinson of Macknade, N.Q., was of interest in that the arrow infection he described was actually responsible for the discarding of a particular line of cold-resistant spontaneums from Tuskmenistan from the breeding programme of the Colonial Sugar Refining Company.

Mr. J. P. Martin, as Chairman of the Standing Committee on Sugar Cane Diseases of the I.S.S.C.T., presented the Committee's listing of sugar-cane diseases and their world distribution. For the first time, this included a section in which the causal agents were arranged alphabetically; hitherto, the diseases had been set out only in relation to their common names and the countries where they occurred. The addition will help workers not primarily concerned with cane to appreciate the particular problems facing the sugar-cane pathologist. Mr. Martin is also a member of a three-man committee charged with the preparation of a text-book on the diseases of sugar-cane. He was able to report to the Congress that Volume 1 of the book, which includes chapters on 21 of the most important diseases of sugar cane, is almost ready and that the Dutch house of Elsevier will publish the book at no cost to the I.S.S.C.T.

Heat Treating Cane Varieties at Meringa

During 1958 experiments were carried out to determine the best type of cane to use when plants had to be hot water treated for three hours at 50°C. for the control of ratoon stunting disease. It was found that best results were obtained late in the season by using top plants from non-arrowed sticks.

Each year on the Experiment Station many varieties have to be heat treated. It is the practice when propagating canes to heat treat all introduced varieties as well as those new seedlings selected from yield observation trials for further tests. Other varieties already being grown are retreated periodically in case there has been any reinfection.

In the first week of September last year 257 different varieties were treated. Top plants of non-arrowed sticks were used whenever possible. Germination surpassed all expectations. Out of the 257 varieties treated 203 gave excellent germination (better than 90 per cent.), 18 gave good germination (about 80 per cent.), 17 gave fair germination (about 60 per cent.), eight were poor, five very poor and six were virtual failures. However, out of the 257 varieties only two failed completely, these being S.J.16 and B.208.

After some years experience in heat-treating cane the following points are suggested:

(1) Do not treat in cold weather. Wait until August at least.

(2) Use top plants of non-arrowed sticks.

(3) Land must be in a fine state of tilth with adequate moisture. Dry conditions are fatal.

(4) Use little cover and consolidate plants.

In some cases it has been found that cutting plants three days prior to treating gives better germination.

G.B.

Gambia Pea Control

By G. C. Bieske

Gambia pea (*Crotalaria goreensis*), once popular as a green manuring legume, but now superseded by more promising varieties, constitutes a weed problem in some Queensland sugar areas. Indeed, in the Mackay district Gambia pea is gradually spreading along roadsides and mill tramlines and, if left unchecked, this legume could present an extensive weed-problem in the near future.

The seeds of Gambia pea germinate in the summer months when soil moisture is sufficiently high, and the young plants make rapid growth during the January-April period, the latter month in the central area coinciding with the commencement of flowering. After the production of seeds the plants die slowly but the tough dead stems remain upright for a number of months and, in an infested cane field, these stems constitute a hindrance at harvest time. Gambia pea seeds prolifically and, in common with many legumes, only a proportion of the seeds germinate the following summer, the remainder of the seeds lying dormant. Gambia pea eradication is therefore not a short-term project once the seed of this legume has been returned to the soil.

Cultivation methods do not offer much scope in controlling Gambia pea in cane fields since many seeds germinate when the soil is too wet or the cane is too far advanced for tractors to enter the field. Hand pulling or chipping has been frequently carried out but these methods are expensive and arduous.

The use of chemical weedicides offers an attractive method of control. Early this year the effects of 2,4-D and 2,4,5-T on Gambia pea were investigated. Regrowth occurred after spraying with 2,4-D at rates varying up to 4 lb. per acre, but Gambia pea proved to be very susceptible to 2,4,5-T. An application of 2,4,5-T at the rate of ½ lb. acid equivalent per acre gave excellent results and this dosage rate is recommended. It is probable that this application rate could be reduced to ¼ lb. acid equivalent per acre with an equally satisfactory kill, and further trials will be initiated next year to test this. The 2,4,5-T used was a 40 per cent. ester concentrate obtainable from the Lands Department for £5 per gallon plus freight. One pint of this soluction contains ½ lb. 2,4,5-T acid so that costs of material per acre would be slightly in excess of 12/6.

Several points when using 2,4,5-T on Gambia pea should be noted. An overnight kill does not occur. Within 24 hours after spraying, distortion and death of growing points commences, but death of the whole plant may take from a week to several months depending upon the stage of growth and climatic conditions. Time of spraying should be delayed until about late March when both older established plants and young seedlings may be treated in one application. Sufficient time is then available for the decomposition of the dead plants before the harvesting season commences. The amount of water used when preparing the spray should be adequate to give a complete coverage.

Since 2,4,5-T is available in different concentrations the following table shows the quantity of the more common formulations required for ½ lb. 2,4,5-T acid:

½ lb. 2,4,5,-T = 10 fluid ounces 80 per cent. 2,4,5-T liquid concentrate
= 16 fluid ounces 50 per cent. 2,4,5-T liquid concentrate.
= 20 fluid ounces 40 per cent. 2,4,5-T liquid concentrate.

(N.B. 20 fluid ounces = 1 pint).

Fig. 29—Drilling out, fertilizing and applying BHC in the one operation prior to seedling planting, Meringa, 1958.
—Photo, J. H. Buzacott

Fig. 30—Canelands of Smithfield and Yorkey's Knob, near Cairns, from Kuranda road.
—Photo, J. H. Buzacott

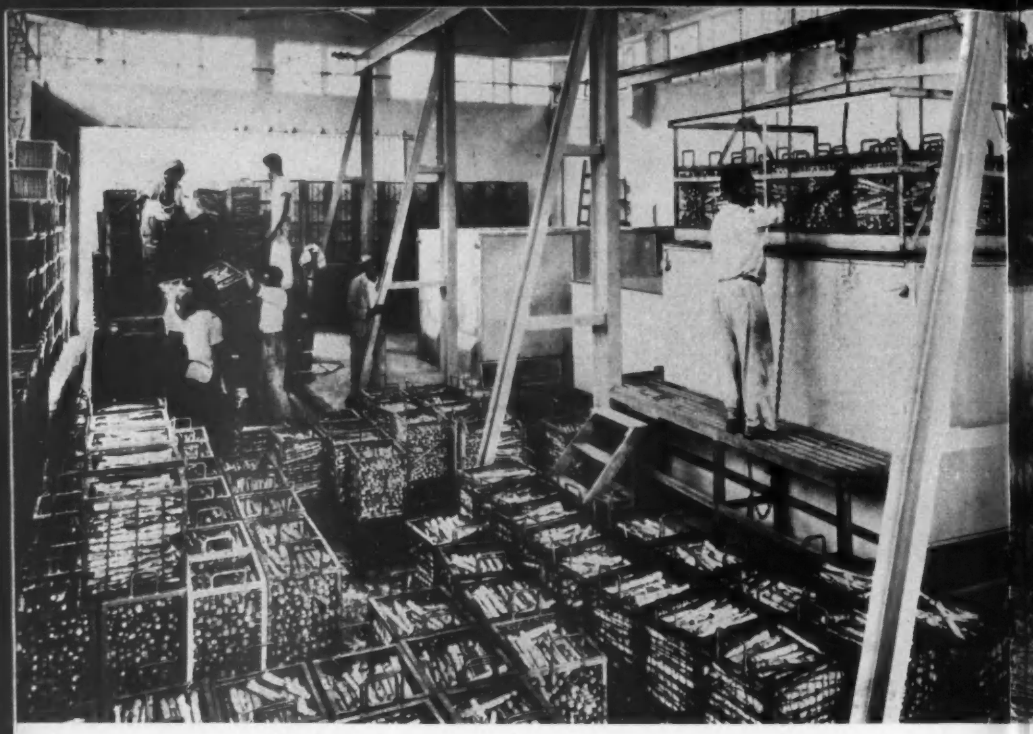

Fig. 31—Interior view of the hot water treatment plant in operation in Mauritius.
—Photo by courtesy Mauritius S.I.R.I.

Fig. 32—The building containing the central hot water treatment plant at the Belle Rine Experiment Station, Mauritius.
—Photo by courtesy Mauritius S.I.R.I.

Fig. 33—Intensive arrowing in the Mackay district, at Barcoo-Habana area.
—Photo, C. G. Hughes

Fig. 34—Sugar Experiment Station Board members with Director during an inspection of Pathology farm at Eight Mile Plains (from left, Mr. Inverarity, Mr. Scotney, Mr. King, Dr. Summerville).
—Photo, C. G. Hughes

Fig. 35—Cattle feeding in a 40 ton crop of excess cane, Elaroo, Proserpine.
—Photo, C. G. Hughes

Fig. 36—Mulgrave cane lands from the air.
—Photo, C. G. Hughes

Nitrogen — Splitting the Application

By L. G. Vallance

In the last issue of the Quarterly Bulletin the value of a green manure crop in supplying nitrogen to increase cane yields was illustrated by the results of a trial at Mackay. Growers will also be interested in the figures obtained recently from another experiment harvested at the end of last crushing on an irrigated farm in the Home Hill district. This particular trial (a first ratoon crop) was part of the programme to determine the most efficient ways to use nitrogen-carrying fertilizers which are so costly and yet so essential.

The main object in this instance was to find out whether better results would be obtained by making the usual top dressing of sulphate of ammonia in one application or by dividing it into two or three equal amounts, and applying it in two or three operations at approximately two-monthly intervals.

Treatment (Average of 2, 4 and 6 cwt. per acre)	Tons per acre	
	Cane	Sugar
Top dressing in one application ..	41¾	7.6
Top dressing in two applications ..	40½	7.4
Top dressing in three applications ..	38¾	7.1

The treatments were:—

(1) *One application,* totalling 2 cwt. per acre—all applied in a single application on 19th November;

(2) *Two applications,* totalling 2 cwt. per acre—first half applied 10th October, second half applied 27th December;

(3) *Three applications,* totalling 2 cwt. per acre—one-third applied 20th September, one-third on 19th November and one-third on 4th February.

These applications were also repeated using 4 and 6 cwt. per acre.

What happened as a result of the variation in top dressing treatments is clearly shown in the accompanying table. At no time during the crop did it appear that there was any advantage to be gained by splitting the top dressing into several applications. When the plots were weighed it was difficult to detect any real difference between them. Actually, the three application method gave a slightly lower yield but this was probably due to some irregularity in the field rather than the treatment. However, it can be said quite definitely that splitting the top dressing was not worth the trouble and the expense of the extra operations.

As far as the actual amounts of sulphate of ammonia used were concerned the picture was quite clear and a very much better crop, both in tons of cane and sugar per acre, was grown by increasing the application of sulphate of ammonia from two to four cwt. per acre, whether it was applied in one, two or three applications. The increase of about six tons of cane or one ton of sugar which was obtained amply repaid the cost of the extra fertilizer. However, it apparently did not pay to increase the top dressing further to 6 cwt. since this did not bring about any added tonnage of cane or sugar.

Splitting the top dressing had no effect on c.c.s. but, as usual, the heavier applications decreased c.c.s. The plots which received 2 cwt. of sulphate of ammonia averaged 18.5 c.c.s., those receiving 4 cwt. averaged 18.3 c.c.s., while those which received 6 cwt. dropped to 18.0 c.c.s.

Crop Disposal

By C. A. Rehbein

In the history of the Queensland sugar industry there has not often been the necessity for wholesale destruction of standing crops of sugar cane. With the State-wide expansion of sugar lands, coupled with better varieties, good seasons, and the continuance of disease and pest eradication, crop tonnages have now increased to a point where only a very bad failure in weather conditions can prevent the over-production of manufactured sugar.

Most growers are reluctant to curtail their plantings and would sooner gamble on the weather conditions to control the growth of their crops. Whatever their attitude may be, sooner or later they will be faced with the problem of the disposal of over-peak, mature crops. Prior to the 1958 season, destruction has been limited to diseased, frosted or flood damaged fields, and the residue in these cases has never reached far in excess of 20 tons per acre, which can be readily ploughed under. However, a crop of 35 tons per acre is a different problem and, at the end of the 1958 season, one northern mill area was placed in such a position with 34,000 tons of standing cane left in the field. The growers in the area had to decide whether to risk leaving the cane standover for the following year or turn under the crop, and fallow with green manure. The majority followed the latter alternative and several different procedures were attempted, some of which are explained in the following paragraphs.

A small percentage of the growers went straight into the fields of green cane with tractor and plough and attempted to turn the whole crop under. Needless to say the going was hard and stoppages frequent—the ultimate result being very poor. Rotary hoes were just as ineffective because the volume of matter to be handled was much too great for the capacity of the implement.

More success was accomplished by burning the field prior to ploughing. However, if the field was ploughed immediately after burning, volunteers appeared in great numbers and had to be destroyed later by another ploughing or successive discings. Only odd volunteers came if the field was burnt then left a week or more before ploughing.

The most popular and successful method of disposal was to burn the crop, disc and roll in lands in the direction of the rows, and plough so that the butts of the cane were first to meet the discs. Sharp discs and plenty of clearance for the plough were also necessary. Green manures were then planted and at the present time many of these fields have been prepared and planted with cane. Residue after preparation is at a minimum.

A small percentage of the standing cane was used as cattle feed. Some fields were rolled flat, two bags of sulphate of ammonia applied and then left to ratoon. Crops of up to 25 tons per acre are now showing but they are infested with weeds and an appreciable amount of unrotted residue still remains.

There is a possibility that a nitrogen deficiency may appear in plant crops on fields where large amounts of cane have been ploughed in, and the grower is advised to watch very closely for this deficiency. As over-production is likely to occur fairly frequently in the future the opportunity is also taken to warn growers that the best way to control the problem on their individual properties is not by reducing their farming efficiency, i.e. by applying less fertilizer; rather reduce the area planted and tend it more thoroughly.

The Control of Ratoon Stunting Disease

By D. R. L. Steindl

Although a very large proportion of the cane being planted in Queensland at the present time is the progeny of cane which has been hot-water treated for the control of ratoon stunting disease, it is by no means all free from this disease, and it is most important that growers should realize that treated cane is not necessarily healthy cane.

In addition, some stocks of healthy cane have been re-infected by the careless use of knives and implements which have not been sterilized after use in diseased crops, and from diseased volunteers which have been left in healthy cane. This re-infected cane has again been used for plants, and so the disease has continued to build up, although in many cases the farmers concerned believe their cane to be healthy.

Fig. 37—Scrubbing a cane knife with a disinfectant solution before cutting plants.
—Photo D. R. L. Steindl

When commercial treatments were commenced in 1953 neither the design of the tanks, nor the method of treatment was all that could be desired, and consequently some batches were not completely cured. At that time it was preferable to use this treated material for plants rather than untreated cane, but some growers believe they can still use the progeny of those early treatments even though in many cases, where the cure was not complete, infection has built up through knife transmission until a high percentage of the cane is again diseased.

A number of our newer varieties, including the promising Q.58, are quite susceptible to ratoon stunting disease. These varieties were free from disease when distributed to growers; however infection has now been noted in Q.58 in several instances, and serious losses have occurred where growers are not taking adequate precautions.

A grower seldom plants his whole farm with clean cane in one year and, consequently, there are usually some old blocks of diseased cane present. If knives and implements are taken from this cane to the healthy cane without sterilization there is sure to be some transfer of the disease.

Knives, cutter-planter blades and other cutting implements can be sterilized by the use of a flame, boiling water or a disinfectant. A trash fire can be used for flaming knives, or methylated spirits can be poured over knives, or other blades, and set alight. Knives can be dipped in boiling water, and quantities of boiling water can be poured over cutter planter blades, etc., but care must be taken that sufficient water is used to wet and heat the blades thoroughly.

A solution of a disinfectant such as one per cent. "F.D.L. cane knife sterilizer", "Mirrol" or "Zephiran" concentrate, or "Dettol", or two per cent. Lysol can also be used. The knives should be scrubbed to remove any adhering matter, and then soaked in the solution for about five minutes. Cleaning the knives by some form of scrubbing is important, otherwise the virus can be protected by the sugar and dirt which accumulates on them.

A great deal of progress has been made in controlling ratoon stunting disease, but those growers who have been relying on stocks from the early treatments for their plant supplies are urged to have fresh batches of cane treated, or to get plants from a recently treated source; and all growers are advised to obtain regular supplies of freshly treated cane. It is most important that all knives and implements used for cutting plants, and planting healthy cane, should be sterilized. Knives or cutting machines should also be sterilized when moving from one block to another. Once a block is infected it is impossible to stop spread within that block, but it is a comparatively simple matter to prevent a healthy block becoming infected. A final precaution in controlling the disease is the removal of all volunteer stools from blocks where healthy cane is to be planted.

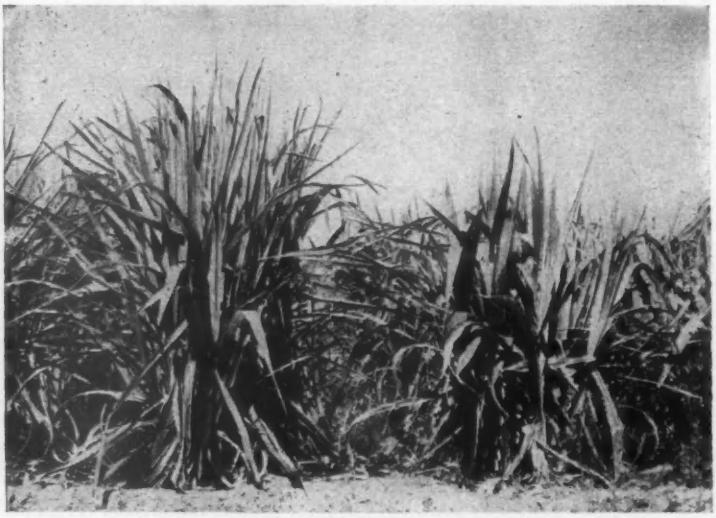

Fig. 38—Plant Trojan on the right infected with ratoon stunting disease; the same cane on the left has been hot water treated.

—Photo D. R. L. Steindl

Where Do New Diseases Come From?

By B. T. Egan

This question is often asked by farmers when a disease, new to their farm or district, suddenly makes an appearance. The answer these days is usually, "It's been there all the time!" But of course, it wasn't always so. Not so long ago, Queensland possessed one of the finest collections of cane diseases in the world because of indiscriminate importation of varieties from overseas by anyone who felt like it. But in these days of strict quarantine, the chances of introducing another disease into Queensland are very small. Streak, smut and scorch are some of the important diseases we've never had in Australia, while we must guard also against such old acquaintances as gumming, downy mildew and Fiji diseases. These last two are very common in New Guinea, making selection of disease-free setts rather difficult. For example, the 1957 American expedition there collected 262 varieties of which 217 germinated and grew. Of these, ten varieties were found to have Fiji disease and were destroyed during the quarantine period. Yet the quarantine measures were so effective that not a single stool of the disease occurred after this period.

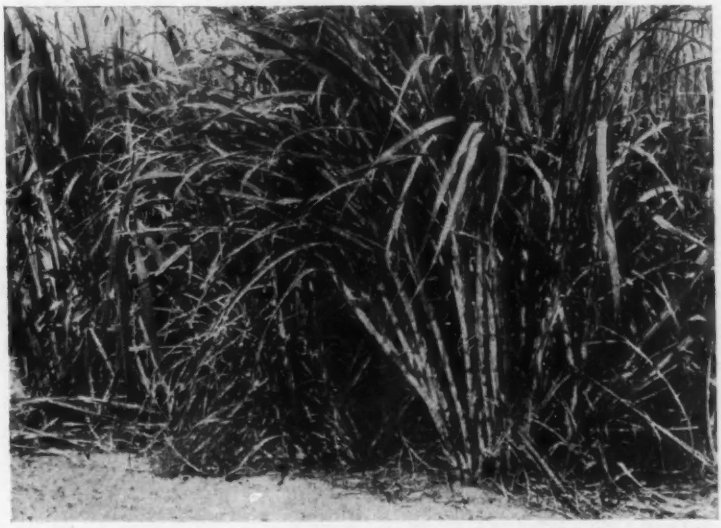

Fig. 39—Co. 290 when free from disease will still produce a good stool. The cane at left is heavily infected with r.s.d.

—Photo D. R. L. Steindl

But to return to our claim that "it's been there all the time." Our questioner will almost certainly say that he's never seen or heard of this disease previously, so how can it have been here. Perhaps the best way to answer this is to use three well-known diseases—red rot, yellow spot and ratoon stunting disease—to illustrate the methods involved. The point of basic importance in the case of red rot is a change in virulence in the causal organism, i.e. the fungus causing the disease underwent a change; in the other two diseases, it was a change in host reaction, i.e. new cane varieties

were introduced and these were very susceptible to the disease.

Strictly speaking, red rot can't be classed as a new disease in Queensland, but it is a convenient local example of what happens when a change takes place in the organism. Co. 290 was quite a popular variety in South Queensland for a number of years and appeared to have a long future. Among its qualities was apparent resistance to red rot. This disease is caused by a fungus which occurs as two main strains, one being light coloured and the other dark coloured in the cultured organism. At the time of which we speak, the light coloured strain was presumably dominant and Co.290 was a resistant variety. Within a couple of years, the dark coloured strain had taken over; to this, Co.290 was highly susceptible and whole fields rotted. The most spectacular instance of this type in sugar cane was the complete failure of P.O.J.213 in Louisiana in 1930-32, again due to strain change-over in red rot. Perhaps the best known of all is the continual change taking place in wheat rust strains, so that new varieties of wheat must be produced frequently to meet this threat.

In the case of yellow spot, another fungus disease, the big chance came when Trojan was rapidly propagated over large areas of North Queensland, coupled with the heavy wet season of 1950. The environment was just what the fungus wanted and, early in 1950, reports came in from all over North Queensland that Trojan leaves were turning yellow and dying. The disease was soon identified as yellow spot, which had been important for many years in Java and Taiwan, and was present in quite a few countries. It had never been identified in Australia, although it was suspected of being present. This heavy infection of Trojan meant that other varieties were being continually bombarded with spores and these also developed the disease. Now, it is a regular feature of cane in North Queensland once the wet season starts, and it causes losses in c.c.s. and tonnage through the destruction of leaf tissue and chlorophyll, especially in years when arrowing is heavy. With the decline in Trojan and the growing of more resistant varieties, such as Pindar and Q.57, this disease is diminishing in importance. But should another susceptible variety become popular in North Queensland, then once again will this disease resume its former prominence.

Ratoon stunting disease is thought to have been present for many years throughout the sugar world, but it was only the introduction of Q.28 in the Mackay area that brought it to notice. This cane was so susceptible to the disease that growth was severely depressed, especially in the ratoon crops, and it became obvious that some unknown factor was at work when cane from good and poor sources was planted in adjacent plots. This disease caused losses amounting to hundreds of thousands of pounds a year yet no one knew it even existed because its only symptoms were hidden inside the cane stalks.

And the future? Well, three years ago bacterial mottle was known to exist only in the Ingham area; but with the introduction of the susceptible varieties Q.57 or Q.66 into the low lying fields of North and Central Queensland, it is now known to occur from Sarina to Mossman. It's quite possible that other diseases of a similar nature may be there right under our noses, perhaps causing serious losses even now, perhaps just waiting their opportunity when a susceptible variety is propagated.

Trees — A Profitable Use for Waste Areas on Farms

By S. O. Skinner

Most canegrowers in North Queensland possess creek banks and other irregular areas which they frequently regard as troublesome waste. This is particularly so since the abandonment of farm horses.

Several growers in Innisfail have planted commercial trees to utilise such areas and these plantings are of considerable future economic value.

It is a fact that any suggestion of tree planting is regarded as a venture too distant in monetary return to warrant consideration. This however is entirely false. Firstly, thinnings, even if used only by the farmer himself, become available within thirteen to fifteen years. Secondly, a stand of trees, irrespective of how small in area or of what age, is an asset which improves the value of the farm—a vast contrast to an otherwise waste area of lantana, burrs, and such undergrowth.

The amount of work entailed in establishing a stand of trees is small and well within the capabilities of any cane grower. Brief details are as under.

Trees of commercial softwood species—Kauri and hoop pines, maple, etc.—are made available by the Forestry Department at a cost of £3/5/- per hundred less fifteen shillings for the return of the containers —a nett cost of £2/10/-. Minimum lot is fifty trees.

Planting is recommended at the commencement of the wet season, with spacing nine feet by nine feet, to give approximately five hundred trees per acre.

The stand becomes out of hand in about five or six years, during which time the only attention necessary on cleared land is periodical suppression of grass and other competitive growth.

Fig. 40—A nine year old stand of Kauri Pine and Maple on a South Johnstone hillside.
—Photo S. O. Skinner

For this the machinery possessed by a cane grower—tractor, mower, discs or rotary hoe—should well suffice. Thereafter with the trees completely "self growing", further attention is largely at the growers own choosing, namely:

(a) To improve quality by producing knot free timber suitable for valuable ply wood purposes, pruning can be undertaken from the sixth to tenth year. The Forestry Department will advise of a four year schedule which will give a limb free height of twenty-one feet. One man can prune one acre per day.

(b) To encourage growth, thinning is desirable at the thirteenth to fifteenth year. Although no commercial use of thinnings is made in North Queensland, there is no reason why this should not be done as in the South. In fact it is stressed that farmers could encourage this by at least using the wood in their own buildings for which it is quite suitable, instead of regularly seeking expensive prime timber.

Further thinning is recommended at ten yearly intervals to leave a final stand of 90 to 120 trees per acre. The stand is considered matured for complete harvesting at 60 years.

The accompanying photograph shows a stand of Kauri and maple nine years old at South Johnstone. Its vigorous growth, now completely out of hand, can be noted. Planted and owned by Mr. A. Stonehouse, an engineer, the only attention which has been given was rough cleaning during the first four years.

Fig. 41—Inside the Kauri and Maple planting. Note the virtual absence of grass and weed growth.

—Photo S. O. Skinner

Hazards—Fire is a danger on large plantations. On closely settled farms however, a little thought is all that is necessary to reduce the risk to negligible proportions.

Availability of Advice—The Forestry Department is at all times keen to assist the land holder by making site inspections, recommending the most suitable type or types of trees, and offering whatever advice may be desired. In North Queensland full details including the economics of any proposed planting may be obtained from The District Forester, Forest Office, Atherton.

BHC for Wireworm Control
Do Not Use Weak Mixtures!

By R. W. Mungomery

Soon after BHC first became available as an insecticide in Queensland, Dr. W. A. McDougall established that wireworms in the Mackay district could readily be prevented from attacking germinating setts in newly planted cane fields by applying 10 lb. of 20 per cent. BHC dust per acre in the drill at planting time. Such a small quantity of insecticide alone was difficult to apply evenly, so, for the sake of convenience and evenness of application, this quantity of BHC dust was mixed with 326 lb. of fertilizer which the grower was normally accustomed to use when planting; thus a 3 cwt. per acre application of this BHC-fertilizer mixture maintained soil fertility and, in addition, gave protection against any wireworm attack that might develop.

Since high concentrations of crude BHC affect root growth adversely, it was recommended in the early stages of BHC usage that care should be taken to keep this chemical from immediate contact with the setts, but not to have it placed more than about an inch away from them, otherwise wireworm control might be impaired. Correct placement was effected by means of various attachments to the delivery tube from the fertilizer distributor on the cutter-planter, and these modifications allowed a small quantity of soil to run in before the BHC-fertilizer mixture fell on top of the setts. This thin layer of soil protected the sett from injury by the BHC-fertilizer mixture, yet it allowed the insecticide to exert its full measure of protection against wireworms.

Actually, when BHC was applied in this manner, 7½ lb. of 20 per cent. dust per acre was able to ensure satisfactory control, while an application rate of 20 lb. per acre had no appreciable adverse effect on root growth. However a compromise of 10 lb. of 20 per cent. BHC per acre was adopted, which allowed a small margin for the control of wireworms and a wider margin of safety for the roots developing on the germinating setts.

As this control measure came to be practised more extensively, it became apparent that many growers were not taking precautions to keep the BHC-fertilizer mixture off the sett. Although this direct application slowed germination somewhat, it had little effect on the ultimate strike and yield, and crop differences were not significant where adjacent direct and indirect applications were compared. Consequent to this finding, little effort was made by growers to determine whether or not the mixture was contacting the sett, and where it was, many of them took no steps to correct this by making the necessary alterations to their implements.

Since that time, however, the use of organic mercurial sprays has developed steadily in the Mackay district, both as a preventive against pineapple disease and as a stimulant to early cane growth; and it now happens that some growers are still allowing their BHC-fertilizer mixtures to fall directly on top of, and around these wet setts. This immediately introduces another problem, since some of the more soluble constituents of the fertilizer are dissolved and remain concentrated around the sett, thereby damaging the sett and causing a "miss" or a delayed strike. Such a result is likely, irrespective of whether the fertilizer contains any added BHC or not, but it is surprising how often BHC is blamed entirely for this happening.

In a mistaken effort to circumvent this trouble, a number of growers have been requesting their fertilizer suppliers to mix 37½ lb. of 20 per cent. BHC per ton of fertilizer instead of the normal 75 lb., and in some

instances this mixture has been applied at the rate of 3 cwt. per acre, or even as low as 2 cwt. per acre. This, in effect, means that 5.6 and 3.75 lb. respectively of 20 per cent. BHC per acre is being applied instead of the standard 10 lb. which is recommended. While damage may not develop when wireworms are not active, and growers may temporarily get away with this practice, these sub-standard dressings are not sufficient to prevent wireworm damage once these pests become troublesome; and it is little wonder that poor strikes can develop, and have developed, under these circumstances.

Now that lindane is being made available as an alternative to crude BHC in fertilizer mixtures for wireworm control, and since it represents only about one-eighth of the quantity of crude BHC required for the same purpose, there should no longer be any reason for growers to fear sett injury from this insecticide, and they should revert to using the recommended quantity. However, advice to keep the lindane-fertilizer or BHC-fertilizer mixtures off the wet setts is still sound because, as previously stated, chemical fertilizers by themselves are able to cause damage when they are applied in direct contact with wet setts.

A Note of Warning

In regard to the above article the Bureau feels bound to sound a note of warning to cane growers who wish to protect their plantings against wireworm attack.

The fertilizer-BHC mixtures recommended for this purpose at planting time are made to Bureau formulation. They should contain 10 lb. of 20 per cent. BHC dust for each acre or, in the newer lindane mixtures, approximately one-quarter lb. of lindane for each acre. Any quantities appreciably below those figures may fail to prevent wireworms causing a germination failure.

The Bureau does not approve of any fertilizer-BHC mixture, containing less than these quantities, being sold to cane growers even though they claim that they wish to apply four bags per acre instead of the usual two.

As mentioned in the above article, there are two ways in which either BHC or fertilizer can affect germination, and both of these can be prevented by the grower. The BHC-fertilizer mixture must be placed so that it is close to, but not in contact with the setts; and where the setts are wet with Aretan, fertilizer burn can be as damaging to the buds as is the BHC to the young roots.

Thirteen years of freedom from serious wireworm damage in Mackay should be sufficient proof to growers that the recommended mixture and method of placement are effective. Therefore, maintain the fertilizer-BHC mixture, or fertilizer-lindane mixture, at the correct strength, and make certain that your fertilizer delivery tube has the correct attachments to divert the fertilizer away from direct contact with the setts.

N.J.K.

Field Day Address — Meringa, 1959

By L. G. Vallance

Chemical weedkillers are expensive. This is an unfortunate fact that limits the usage on sugar cane farms of these very useful materials. The Bureau is continuously receiving requests from the large overseas chemical companies to test out their latest weedkillers. This we painstakingly do in the majority of circumstances, since we cannot afford to neglect any avenue that might lead to more efficient and more economical weed control. Unfortunately however the result invariably is that, while the chemical is capable of doing a good job, the cost is prohibitive. This has occurred so frequently of late years that it is difficult to foresee any large scale adoption of these methods while the costs of manufacture of the weedicides and the cost of structure of our sugar industry remain unchanged.

Recently some trials were carried out at Meringa with various weedicides, including that known as CMU. This chemical is used extensively in the Hawaiian sugar industry where it has very largely replaced 2,4-D as the pre-emergence weedicide used for controlling weeds on a large proportion of their sugar lands. Actually, our work here showed that CMU was effective and, as in Hawaii, it was better than 2,4-D. However, at a cost of nearly £18 per acre per application for material alone, the method was obviously not a practical proposition.

Just recently the Du Pont Chemical Co., one of the world's largest manufacturers of chemicals, sent out a technical representative from America to explore the possibilities of using their latest types of weedicides in our sugar industry. The Bureau very willingly co-operated in this project and the representative was shown canefields and weed problems from Bundaberg to Cairns. He very quickly concluded that unless we could buy at much lower prices it seemed unlikely that his company could ever foster a large scale usage of its products on our cane farms. Nevertheless the Bureau has accepted from Du Pont fairly large test samples of their latest weedicides "Monuron" and "Diuron". These are CMU type weedicides, and trials with them are now in progress in all our major districts.

I mention these things merely to let you know that you are not being neglected in the matter of testing all the modern chemicals you frequently read about, and which get a considerable amount of publicity in overseas publications. Whether these will ever be available at a price at which they can be fitted into our farm economy is a matter over which we have no control.

However, in spite of the fact that it seems unlikely that chemicals will ever replace cultivation for general weed control, there are many special problems in which weedkillers are extremely useful. For instance, the use of Dalapon in areas infested with reed grass has given effective control of this pest. Previously, on heavily infested land it was practically impossible to grow an economic crop of cane, but now, applications of Dalapon at 15 to 20 lb. per acre are most effective in rehabilitating those fields. There is also no doubt about the efficacy of the aerial spraying of 2,4-D for the control of vine weeds in standing cane. The fact that several thousand acres are now sprayed annually in North Queensland is ample testimony of the practical value of the method. On our station here,

we regularly use a mixed contact and 2,4-D spray on the ends of cane rows and this prevents spread from the headland of weeds and grasses with their resulting seed problem. Heavy applications of 2,4-D, or fumigation with methyl bromide, are very effective in eradicating small isolated patches of nut-grass which are located in otherwise clean areas and which constitute a source of further spread.

I would also like to say a few words regarding the control of guinea grass. From time to time in recent years the Bureau has had requests that it commence a large scale programme with the apparent ultimate object of eradicating guinea grass from North Queensland. Even if this were practicable, a little thought must surely question the wisdom of attempting such a feat. Even if we discount its value as stock food, and its very beneficial effect in preventing soil erosion, we must admit its value in smothering other weeds which could, quite probably, have much more nuisance value.

Cane farmers in North Queensland have now learnt to live with guinea grass for many years and, in the normal course of farm management, routine mechanical cultivation methods have always provided satisfactory control.

Nevertheless it must be admitted that there are special circumstances in which the establishment of guinea grass in a cane field will present a very difficult problem. I refer to fields where cane growth is uneven so that, although the greater part of the block is out of hand, there will be a few weak patches present with poor cover. In these backward areas the control of guinea grass is costly since it is normally done by hand pulling or chipping. It is under these circumstances that weedicides, properly used, can be extremely helpful. The application of a contact plus 2,4-D weedicide in these patches of poor cover will give very effective control of guinea grass for an overall cost of £5 to £6 per treated acre. That this is a practical proposition was recently demonstrated in a trial at Freshwater. The details of the method and quantities of weedicide used were published in the last October issue of the Quarterly Bulletin. Should you be interested, we would be pleased to give further information of this useful method of guinea grass control.

The weedkiller Dalapon has also shown that it has a very marked effect on guinea grass and para grass. Unfortunately expense is again the prohibiting factor. Para grass is a nuisance in drains and water channels and under these conditions it is frequently very difficult to control. An application of Dalapon at the rate of 30 to 40 lb. per acre will cause an appreciable depression in growth for a period of 2 to 3 months. Unfortunately the grass will recover, and further treatment will be required. I feel that if this chemical were cheap enough, so that adequate amounts could be used, there would be little difficulty in controlling para grass in drains and similar sites where mechanical methods are not applicable. It is of interest to mention that we have controlled this grass very economically in a waterway on our own station at Mackay by using t.c.a. (sodium trichloroacetate) at the rate of 100 lb. per acre.

Finally, it seems quite clear that although we have access to the most effective and most modern weedkilling materials and we also have the know-how to use them, our difficulty lies in the fact that their cost is too high to allow them to find a place in our normal farming methods, except for the special purposes already outlined.

Q.57 and Blue-top

By C. G. Hughes and S. O. Skinner

Blue-top (billygoat weed, *Ageratum* species) is a weed that's everywhere from Mossman to the border and is often the subject of the cangrower's concern as it takes charge of thin and open crops when he can no longer get into them with his cultivator. From late summer onwards it needs no encouragement and, unless the canopy of leaves is maintained intact until harvest, can quickly become well established. Loss of foliage through any cause—grubs, yellow spot, or heavy arrowing — will allow the necessary breakthrough, and the exposed soil soon becomes a bed of blue-top seedlings. The mere sight of blue-top in a normal variety is enough to conjure up visions of burning troubles and consequent harvesting difficulties but, in this respect, Q.57 is not a normal variety, or at least it is not in the wet areas of the State this year. There, during one of the dullest, dampest and longest wet seasons on record, it has well maintained its reputation as a producer of sugar when sunlight is low; but some farmers became worried as harvest time approached when blue-top started to appear in fairly heavy crops. It looked as though the old story was to be repeated. However, experience falsified the forebodings: the self-stripping Q.57 had dropped its leaves in neat windows along the base of the stools and so the centres of the interspaces were left open, and naturally blue-top took advantage of it; but the concentrated masses of leaves gave a really excellent burn just where it was wanted about the stalks.

The photograph shows the characteristic habit of a well-grown crop of Q.57 at Innisfail, with blue-top in the interspace in July.

C.G.H., S.O.S.

Fig. 42—Q.57 is a self-stripper and the blue-top at harvest does not normally interfere with burning.

—Photo C. G. Hughes.

An Unusual Cause of Germination Failure

By L. S. Chapman

It is by personal experience that we learn the hardest lessons, and recently a Giru farmer learnt his lesson the hard way. In an attempt to save time, this grower decided that it would be more convenient to take four drums of a mercurial solution into the field to do his planting, than to have only two drums. To get the two extra drums he used two which had previously contained 2,4-D concentrate. After rinsing them they were filled with water, and finally the mercurial solution was mixed in the usual concentration.

Some six to eight weeks later the field staff at the Experiment Station were asked to investigate why four acres of cane were not germinating. An inspection of the setts revealed that the root buds had not developed normally, and they resembled bulbous swellings, browned at the tip. The eyes had swollen, and some from the top setts of the stick had shot and emerged, but even these shoots had not developed a normal root system. The setts were sound, and had not decayed abnormally. It was evident that the four acres would have to be replanted to be assured of an even strike.

The photograph illustrates the normal strike obtained on the left, while on the right is the area which failed to germinate.

Fig. 43—Showing normal strike obtained on left but on the right the cane failed to germinate because of 2,4-D contamination.

—Photo L. S. Chapman

It was concluded that a small quantity of 2,4-D remained in the drums after rinsing, and that this had mixed with the mercurial solution and subsequently been sprayed onto the setts. It is not known what concentration of 2,4-D was actually sprayed onto the setts, but it must have been extremely low.

There is no doubt in the mind of the farmer or of the writer that a weak concentration of 2,4-D in the mercurial solution caused the poor strike, as the area of the two strips, which is four acres, would be the area treated by two drums of mercurial solution;

using a spray planter it is normal to use 20 gallons of mercurial solution per acre. The source of plants was the same throughout the block and the block received the same soil preparation and treatment after planting.

The lesson from this observation is apparent. Growers should be careful with all chemicals and weedicides, and should reserve equipment to be used for spraying poisons for that use only. If this cannot be done, then extreme care should be exercised in cleaning this equipment before it is used for other purposes.

Refresher Course in Pest and Disease Control

The Bureau is organising a refresher course for supervisors and inspectors employed by Cane Pest and Disease Control Boards.

Arrangements are being made for a period of four or five days during November—a time which it is thought will be best suited to the majority of the supervisors. Invitations have been issued to the twenty-one Boards in the State to send their supervisors and inspectors to attend this course which is aimed at gaining greater knowledge of, and familiarity with, a wide range of diseases and pests.

It is eighteen years since the only other such course was arranged by the Bureau and, in the intervening time, many new men have taken over the duties associated with pest and disease control in the various areas. In fact, of the fifteen who attended the previous school only five are now engaged on similar work.

The Bureau's Pathology Farm near Brisbane contains so much of interest and value in the cane-disease field that a good proportion of the available time of the course will be spent there. And the Bureau's new pathology laboratories and conference room will provide all necessary facilities for lectures, demonstrations and projection of slides. The glasshouse work on chlorotic streak disease transmission will be an added item of interest.

The refresher course will be under the control of the Bureau's pathology and entomology staff and it is hoped that all supervisors and inspectors from both compulsory and voluntary Boards will be present. There will be ample opportunity for open discussion on a variety of disease and pest topics.

N.J.K.

Random Gleanings

For the first time radioactive techniques are being used in the Queensland sugar industry. The Bureau of Sugar Experiment Stations formulated its plans during 1958 to study the behaviour of cane juices in a subsider by adding radioactive tracer material at the point of juice entry and following its course by monitoring instruments. The actual work will be conducted by Bureau staff in co-operation with experienced personnel from the Australian Atomic Energy Commission during the 1959 crushing season. The study should provide clearer information on what happens to juice in a subsider than is available by other means.

★

The article in this issue dealing with grass control on mill tramlines should be of interest to millers in various parts of the sugar belt. Keeping tramlines clean of weeds and grasses can be a costly matter—using the traditional chipping and steaming methods. And, in any event, those methods are very shortlived in their effects. Some contemporary weedicides are long lasting and, even though their price is relatively high, there is a big saving in labour and machinery costs when consideration is given to the speed of application. A motorised trolley on tram tracks can carry its own boom spray and treat the grasses effectively at a speed of four miles per hour.

★

One of the conventions in the Australian sugar industry is to refer to the strength of our raw sugar in terms of a net titre value; for example we calculate our output from the mills as so many tons of 94 n.t. sugar. There must have been some broad grins on the faces of sugar-town listeners recently when a northern radio station gave the estimate for the 1959 crop as so many "tons of Northern Territory sugar".

★

The Bureau has been conscious for some time of the potential threat to our cane crop if a new strain of mosaic disease evolved in our cane fields or was introduced from overseas. Separate strains are known to exist in Louisiana and a cane variety which is resistant to the older strain can be susceptible to a newer one. It would appear that this very thing has happened in Mackay and efforts are being made to eradicate the new strain which is present on several farms. These mutations of an organism are always possible. Just recently a previously unknown strain of gumming disease has been recorded on the island of Reunion, near Mauritius, and there is good reason to believe that the leaf scald outbreak in British Guiana in recent years is a different strain to our leaf scald disease in Queensland.

★

The forecast of approved variety changes which appears in this issue contains four new "Q" canes to be added to various southern and central mill areas. Two of these are being specifically approved for the Isis district where peculiarities of soil and climate do not appear to favour many of the canes grown commercially in Bundaberg. The two in question have performed very well on the Isis red soils although, as Bundaberg seedlings, they showed little promise in that area.

Q.71, which is being added to some of the southern lists, has been selected because of its high sugar content and, doubtless, it will replace some of the C.P.29/116 now being grown.

FREE SERVICES TO CANE GROWERS

The Bureau offers the following free services to *all* cane growers in Queensland:—

Soil Analysis and Fertilizer Recommendations

Your soil will be analysed by the most modern methods, and a report will be posted containing a recommendation covering the type of fertilizer required, the amount per acre, the need for lime, and other relevant information. Phone the nearest Bureau office and the soil samples will be taken as soon as possible.

Culture of Green Manure Seed

Cultures and instructions for the inoculation of the seed of cowpeas, velvet beans, mung beans or any other legume will be posted to any cane grower upon request to The Director, Bureau of Sugar Experiment Stations, Brisbane. Allow a week after receipt of your letter for the culture to be prepared and posted, but as the culture will easily keep a month or so it is a good idea to get your culture when you get your seed. If sowing is delayed, ask for another batch of culture; there is no charge.

Advice on All Phases of Cane Growing

The Bureau staff is at the service of all cane growers. They can best advise you on matters pertaining to varieties, fertilizers, diseases, pests, drainage and cultural methods. Bureau officers are available in every major cane growing district. A phone call will ensure a visit to your farm.